

Observations of the Horizontal Refraction of the Sun.

By A. Lang, Esq.

The observations were made on the rising, from the horizon of the Sea, of the Sun's upper or lower limb, or both combined, so as to determine the exact moment of the rising of his centre, and from that the exactly computed zenith distance at that moment, for the purpose of obtaining the refraction, through comparison with the actual zenith distance of the horizon of the Sea, as measured and determined at the place of observation. The place of observation, "my Observatory" in the Island of St. Croix, in lat. $17^{\circ} 44' 32''$ N., long. $64^{\circ} 41'$ W. from Greenwich; height of the axis of my Altitude and Azimuth circle (Troughton) above the level of the sea, 440 English feet, most carefully measured in every way (tube only a few inches); angle of depression of horizon of the Sea, as determined by the instruments, I have never found less than $20' 52''$, and never beyond $21'$, and the last very rarely. I have therefore assumed the angle of depression for the following observations as $20' 56''$, or zenith distance $90^{\circ} 20' 56''$; the height of my eye in observing the Sun being always at the same height above the Sea-level as the axis of the Circle, but in an adjoining apartment, near my mean-time clock, that I might hear and count the seconds. Telescope used, an excellent 44-inch refractor, using a magnifying power of 42, always previously fixed on the spot where the Sun would rise.

	Zenith Distance of Sun's Centre.		Refraction and Parallax.	Barom. Ins. Pts.	Therm. Fahr.
	By Computation.	Actual Observation.			
1831, May 3	$90^{\circ} 53' 25''$	$90^{\circ} 20' 56''$	$32' 29''$	29.63	76°
June 20	$52' 44.8$	„	$31' 48.8$	$.70$	73
1832, June 5	$52' 58.7$	„	$32' 2.7$	„	79.5
Oct. 27*	$54' 4.5$	„	$33' 8.5$	„	„
1833, July 31	$53' 11.5$	„	$32' 15.5$	$.63$	79
Oct. 31	$53' 6.4$	„	$32' 10.4$	$.62$	77.5
Nov. 1	$52' 50.5$	„	$31' 54.5$	$.53$	78
1834, May 3	$53' 11.1$	„	$32' 15.1$	$.69$	78
July 11	$52' 57.8$	„	$32' 1.8$	$.60$	79
Oct. 25	$53' 6.9$	„	$32' 10.9$	$.62$	79
1837, July 30	$53' 6.9$	„	$32' 10.9$	$.67$	78
1839, May 17†	$90^{\circ} 53' 1$	„	$32' 5$	29.635	77

* I am not satisfied with this observation.

† The observation of May 17, 1839, which I have carefully computed, should be more correctly stated $90^{\circ} 53' 14''.82$ ($-90^{\circ} 20' 56'' = 32' 18''.82$). It attracted my notice, as the time was exactly determined by a transit immediately afterwards. It is singular it should so exactly agree with the mean of 17 observations.

	Zenith Distance of the Sun's Centre.		Refraction and Parallax.	Barom. Ins. Pts.	Therm. Fahr.
	By Computation.	Actual Observation.			
1840, May 11	90° 53' 47".7	90° 20' 56"	32' 51".7	29.64	77°
1844, July 30	52 56.8	"	32 0.8	.57	79
1846, May 13	53 42.4	"	32 46.4	.61	79
17	53 37.6	"	32 41.6	.55	78
1848, Feb. 17	90 53 22.7	"	32 26.7	.55	70
	17)905 12.8		549 20.3	15)92.85	16)1240
	90 53 10.84	90 20.56	32 18.84	29.619	77.5
1857, Oct. 27*	90 53 25	"	32 29	29.547	77.5
30	53 19	"	32 23	.602	78
Nov. 1	53 22.6	"	32 26.6	.593	78.6

The altitude of my Observatory above the level of the sea, 440 English feet, causes a depression in the barometer of 0.455 inch.

From my station, the rising of the Sun from the horizon of the sea can only be seen in May, June, July, part of October, November, and February. The setting of the Sun into the horizon of the sea, not at all. Moreover I have sometimes every morning, for six weeks running, watched, disappointed, to get an observation on his rising, in consequence of dense low clouds of cumuli at horizon. To this day I have not obtained a single observation this year. So it is not so easy a matter as may be imagined.

St. Croix, 11th July, 1862.

On the Practicability of observing the Occultation of Stars by the Moon at Sea. By David Smith, Esq.

The author, in his communication addressed to the President and Council of the Society, writes as follows:—

It is not without some degree of hesitation that I take the liberty of forwarding you the results of my own experience as regards the practicability of observing Occultations of Stars at sea. The desire I feel that this most invaluable method for determining the Longitude may come into more general use amongst Naval men will, I trust, be a sufficient apology for my addressing you.

The method, as far as I can ascertain, has been, but with few exceptions, wholly neglected at sea: this has, no doubt, arisen from a supposition that the motion of a vessel would

* "An admirable observation" is added to the observation in my Journal.